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ABSTRACT

A 3 year project to develop a beginning braille reading series was undertaken, beginning with research reviews on concept development, tactual perception, braille reading, and general reading. Analysis of vocabulary lists and specifications followed, culminating in development of the readiness, preprimer, and primer readers with accompanying workbooks and teacher editions. Materials were reviewed by a consulting committee and field trials were completed in seven public and residential sites before final review and revision. In addition, criteron referenced tests were developed to accompany each level of the program. The resulting series, "Patterns: The Primary Braille Reading Program," may help to meet the needs of beginning braille readers. (CL)

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Final Report

Project No. 443CH70602
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# DEVELOPMENT OF A BEGINNING BRAILLE READING SERIES

1979

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Department of Health, Education, and Welfare

U.S. Office of Education
Bureau of Education for the Handicapped

Table of Contents


| | |
|---|---|
| Abstract | 1 |
| Introduction | |
| Problems in Braille Reading | 2 |
| Factors Related to Problems in Braille Reading | 2 |
| Purpose of the Research Project | 4 |
| Structure of the Project | 5 |
| Progress during 1st Year | 6 |
| Progress during 2nd Year | 9 |
| Progress during 3rd Year | 11 |
| Progress during Extension Period | 12 |
| Project Summary | 14 |
| Future Directions | 14 |
| References | 16 |

## Abstract

The 3-year project described in this report was undertaken to develop a beginning braille reading series. The objectives of the project were:

1. Principal objective

   To develop a set of beginning reading materials specifically designed to minimize problems encountered by the beginning reader of braille.

2. Subordinate objectives

   a. To write detailed coordinated specifications for students texts, workbook materials, and teachers' editions, using all relevant information from research on braille reading and print reading.

   b. To analyze common word lists to identify words to be used as vocabulary in specially designed braille readers.

   c. To write special braille readers based on these specifications and vocabulary lists.

   d. To develop special braille workbook materials based on these specifications and word lists.

   e. To write teachers' manuals meeting these specifications.

   f. To submit all materials as developed to review by an expert committee and revise as required.

All these objectives were met and the beginning braille reading series entitled Patterns: The Primary Braille Reading Program has been developed. Procedures and activities for accomplishing this task are described in detail in this report.

## Introduction

### Problems in Braille Reading

Reading has long been acknowledged to be a critical factor in the educational progress of children. The task of learning to read is never a simple one regardless of the medium through which the skill is acquired. However, children who read print have access to materials which are specifically designed to minimize the difficulties of the reading task. This is accomplished through the control and sequential presentation of vocabulary, reading skills, and concepts. However, no such control is exercised in the development of reading materials for visually handicapped children who must use braille as their reading medium. The standard practice in publishing braille materials to teach reading is to transcribe primary print readers into braille. This practice creates a number of problems for beginning braille readers.

One major problem arises from the differences in representing words between print and the shorthand braille code. Contraction and abbreviation of words in the braille code change their relative reading difficulty as compared to print, thereby invalidating the concept of controlled reading vocabularies. Concepts used in print readers are often highly visual (stress on colors) or irrelevant to the direct experience of the beginning braille reader (look at the sun). Print readers rely heavily on pictorial content to provide context. Workbooks accompanying print readers are highly pictorial which seriously impedes their reproduction in legible tactile formats to which blind children can make meaningful responses. As a result, many blind children experience great difficulty and delay in learning to read.

A special reading program which takes into account the unique attributes of the braille code and of children who use this code as their reading medium would do much to overcome the problems cited above. Such a program would eliminate problems resulting from direct translation of print reading programs into braille and, at the same time, provide beginning braille readers with materials which are specifically suited to their needs.

### Factors Related to Problems in Braille Reading

Much of the difficulty young visually handicapped children encounter in learning to read can be ascribed to the fact that reading materials used by these children have traditionally been transcribed from the print editions. As Lowenfeld, Abel, and Hatlen (1969) and Rex (1970) point out, many children have successfully learned to read using these materials. However, Rex reports that to a great extent, teachers must supplement these texts with their own specially created materials. The literature describes a number of problems arising from the direct translation of print readers into braille. One very obvious problem is the elimination of the cues to

meaning arising from the elimination of pictures. Ninety percent of 101 beginning reading teachers who responded to a survey by Bleiberg (1970) believed that there was a visual emphasis in the series they used. This, of course, resulted from the use of pictures to give context. Eighty-three percent of the teachers expressed dissatisfaction with the resulting content of the readers. Bleiberg concluded that, "The books presently in use do not meet the needs of blind children who are learning to read. The content of the books should have less emphasis on visual imagery and more emphasis on the senses that blind children use, e.g., touch, smell, hearing, and taste" (p. 136).

Other problems arise from the fact that braille reading appears to be a more difficult intellectual task than does print reading (Nolan and Kederis, 1969, p. 46). Ashcroft (1960) made the following remarks regarding reading materials,

> Instructional materials for reading in braille should be provided at appropriate difficulty levels for the reading development level and experience of the students. Materials in which there are many multiple-cell contractions, short form words, and lower cell contractions seem to cause special difficulties for children reading braille. Conventional print readability evaluation procedures may overestimate the readability of materials transcribed into braille (p. 87).

Another major problem in braille reading is the limited number of patterns that can be derived from the six dot cell. Because of this, the same shape must be used repeatedly in different orientations and the same shape may assume different meanings depending upon the context within which it appears. This often presents major learning problems to beginning readers (Bleiberg, 1970; Rex, 1971). This ambiguity in the code is doubtlessly responsible for reading errors, vertical alignment errors, and horizontal alignment errors described by Ashcroft (1960). These problems, again, emphasize the need for special materials which minimize problems arising from the peculiarities of the braille code. Elimination of punctuation and controlled presentation of braille code characters (vocabulary) might be a step in preventing these problems.

Other problems include the use of print materials for primary braille reading which ignore difficulties arising from the use of contractions in braille. One such problem is the "dual spelling of words such as 'in,' 'was,' 'to,' etc. which appear in both contracted and uncontracted form" (Rex, 1971, p.3). Another problem arises from similar configurations which occur "when lower-cell forms are used, or similar two-cell contractions" (Rex, 1971, p.4). Bleiberg (1970) states that, "Pupils should be introduced to the contractions that are easiest to read and write and gradually progress to

the lower sign contractions, initial letter contractions, and the final letter contractions. Repitition of the contractions should be stressed" (Bleiberg, 1970, p. 3).

Pertinent research by Nolan and Kederis (1969) reveals that the perceptual unit in braille reading appears to be the braille character and not the braille word. Therefore, it seems that the whole word approach to teaching braille reading needs to be de-emphasized (Rex, 1971). As Chall (1967) suggests for all readers, a stronger phonic approach is needed. However, to achieve this for braille readers, materials must be designed to avoid the "non-phonetic aspects of the code which the use of contractions frequently imposes" (Rex, 1971, p. 4).

Following a review of the research literature on braille, Cline and Cardinale (1971) strongly urged the creation of a series of basal readers designed for braille students sequenced to agree with the research findings on reading errors and perceptual factors in reading. Also, development of these materials was strongly recommended by the APH Primary Braille Reading Consulting Group (Caton, 1970). While these materials would not necessarily replace braille transcriptions of print reading series, they would serve as a valuable adjunct to these materials. For students with reading problems, such a series would greatly enhance the probability of learning to read and would facilitate roles of growth and achievement in this area.

## Purpose of the Research Project

In order to alleviate some of the problems just described, a project was initiated at the American Printing House for the Blind to develop a beginning braille reading series for children who must learn to read in this medium. This was a 3-year project funded by the Bureau for the Education of the Handicapped. Work on the project began in September 1975 and was completed in August 1978. The principal and subordinate objectives were as follows:

1. Principal objective

   To develop a set of beginning reading materials specifically designed to minimize problems encountered by the beginning reader of braille.

2. Subordinate objectives

   a. To write detailed coordinated specifications for student texts, workbook materials, and teachers' editions, using all relevant information from research on braille reading and print reading

   b. To analyze common word lists to identify words to be used as vocabulary in specially designed braille readers

c. To write special braille readers based on these specifications and vocabulary lists

d. To develop special braille workbook materials based on these specifications and vocabulary lists

e. To write teachers' manuals meeting these specifications

f. To submit all materials as developed to review by an expert committee and revise as required

## Structure of the Project

In order to meet these objectives, this 3-year phase of the project was considered to be the developmental phase. During this phase, the principal objective was met. That is, a set of beginning braille reading materials specifically designed to minimize problems encountered by the beginning reader of braille was developed. As the principal objective was met, the subordinate objectives were also achieved. Specifically, a detailed set of specifications for the entire set of materials was written, word lists were analyzed and the vocabulary selected, six levels of reading materials were written, and the materials were submitted to an expert committee for review and appropriate revisions. The six levels of the reading program are as follows:

1. Readiness Level
2. Preprimer Level
3. Primer Level
4. First Reader Level
5. Second Reader Level
6. Third Reader Level

The materials for each level include a student text in braille with accompanying worksheets and a teachers' edition.

Although plans for an extensive field trial of these materials were not included in the original proposal, project personnel determined that an evaluation component of this type would greatly enhance the quality of the materials developed. Therefore, field trials were initiated during the 2nd year of the developmental phase of the project. The procedure used was as follows:

1. The readers and their accompanying materials were placed in both residential and local day school programs with students whose primary reading medium was braille.

2. Each student began at the readiness level and progressed through the other levels at his own rate.

3. A criterion referenced test for each level (developed in a project funded by the American Printing House) was administered as each student completed that level.

4. Child use data were collected from teachers as students completed each level.

5. Each level was subjected to extensive review by the project's consulting committee, composed of experts in the field of braille reading.

6. Data from the criterion referenced tests, child use data from teachers, and recommendations from the consulting committee were then used to make necessary revisions at each level.

The discussion of the structure of the project is expanded below. Specific descriptions of activities during each year of this developmental phase are given in detail.

Progress during 1st Year (1975-76)

The major objectives for the 1st year of the project were the development of a detailed set of specifications for the braille readers and their related materials and the development of vocabulary lists to be used in the writing of the stories. In addition, a consulting committee was formed.

1. Development of specifications and vocabulary lists

In order to develop specifications for the reading materials, a thorough review of research in the areas of braille reading, general tactual perception, development of concepts by blind children, and general practices in teaching reading was conducted. In order to develop vocabulary lists, standardized word lists such as those developed by Buckingham and Dolch (1936) and Thorndike and Lorge (1944) were analyzed and potentially useful vocabulary was identified. Progress in achieving these objectives was as follows:

a. Review of research on concept development was completed.

Problem areas which were identified for blind children included lags in progression through developmental stages and lack of environmental concepts resulting from the lack of necessary experiences to develop these concepts.

b. Review of research on tactual perception was completed.

Specific areas included in this review were the legibility of tactile symbology, legibility of tactile formats, and efficiency of search formats for tactile displays.

c. Review of research on braille reading was completed.

Specific areas which were identified included orders of difficulty for braille character recognition, types of errors most common in braille reading, frequency of occurrence of specific braille characters, perceptual factors in braille word recognition, and problems in braille reading arising from direct translation of print readers to braille. In addition, the story content of print readers in current use was analyzed in order to identify topics appropriate for use in stories to be included in the braille readers.

d. Review of research in general reading was completed.

Areas which were reviewed included perception (sensory modalities, processes, discrimination, etc.), motor skills, language problems, experiential background, cognition, and reading interest. The procedure used in this review was that of first analyzing research in these areas which were related to blind children to determine the relevance of the topics to the development of the braille readers. Following this, research in the relevant topic areas was reviewed. Decisions regarding the approaches to teaching reading to be used in the braille reading series were based on the results of this review.

e. Vocabulary lists were analyzed.

Standardized word lists were analyzed in order to identify potentially useful vocabulary for the braille readers. Words were categorized and listed according to those which are fully spelled out and those which are contracted and abbreviated.

f. Specifications were written.

Research in the areas listed above was carefully analyzed and summarized. Following this, a detailed set of specifications was written. It contained two sections: Section I - Vocabulary Development and Section II - Teaching Methodology. Those specifications were then furnished

to a directing editor who had the major responsibility for the writing of the braille readers, workbook materials, and teachers' editions for the beginning braille reading series.

2. Formation of consulting committee

During the 1st year of the project an expert committee was formed to act as consultants to the project. This committee is composed of the following persons:

Mrs. Ruth Craig, Supervisor (Retired)
Special Education of the Visually Handicapped
Brigham Young University
Provo, Utah 84602

Dr. Eric Hamp
University of Chicago
The Department of Linguistics
Goodspeed Hall
Chicago, Illinois 60637

Dr. Phil H. Hatlen
Professor of Special Education
San Francisco State University
1600 Holloway Avenue
San Francisco, California 94132

Miss Freda Henderson
Curriculum Director (Retired)
Tennessee School for the Blind
16603 York Road
Monkton, Maryland 21111

Dr. Earl Rankin, Associate Professor
Department of Educational Psychology & Counseling
University of Kentucky
251 Dickey Hall
Lexington, Kentucky 40506

Dr. Evelyn Rex
Department of Special Education
Illinois State University
Normal, Illinois 61761

Miss Marilyn Sorensen, Consultant
Vision and Physically Handicapped
Minnesota State Department of Education
Capitol Square Building
St. Paul, Minnesota 55101

Mrs. Bonnie Trowbridge
Teacher of the Visually Handicapped
Douglas School
Pekin, Illinois 61554

Mrs. Mila B. Traun
Tennessee School for the Blind and
George Peabody College for Teachers
Nashville, Tennessee 37216

It was the responsibility of this committee to review all materials as they were developed for the project and to make recommendations to the project personnel for the revision of materials. In addition, the services of a well-known editor of childrens' books were acquired to do the actual writing of the series. This editor is:

Mrs. Eddy Jo Bradley
1223 Elmwood
Evanston, Illinois 60202

Progress during 2nd Year (1976-77)

The major objective for the 2nd year of the project was the development of the readiness, preprimer, and primer readers with accompanying workbook materials and teachers' editions. Progress in achieving this objective was as follows:

1. Writing of the readiness level completed

   The readiness level, consisting of 35 lessons, was written. This level consists of two student booklets with a total of 78 pages and a teachers' edition with detailed lesson plans for each of the 35 lessons.

2. Writing of preprimers initiated

   Due to the fact that the field trial of the lessons of the readiness level was greatly expanded to include child use of the materials, the writing of all three preprimers was not completed as originally scheduled. The first preprimer, its accompanying workbook materials, and the teachers' edition were written as scheduled. The remaining two preprimers, bringing the total to 36 lessons, were completed by May 1977.

3. Writing of primer initiated

   For the reasons cited above, the writing of the primer was not completed as originally scheduled. However, the plan for the writing and organization of the primer was developed on schedule by a subcommittee from the consulting group, the directing editor, and staff personnel. The entire primer, consisting of 36 lessons, was written by July 1977.

4. Initial review by consulting committee

As sections of the readiness level were written, members of the consulting group met with the directing editor and project personnel to review the lessons and develop plans for writing subsequent lessons in the series. In addition, project personnel met with the directing editor on several occasions to review progress and plan for future activities.

5. Field trials initiated

As stated above, the field trial phase of the project was greatly expanded as the materials were developed. The original plan for the field trials proposed to develop a complete program of readers and accompanying materials at each level and place these materials in the field for a short teacher review as each level was completed. However, on the recommendation of the directing editor and consulting committee, a decision was made to place these materials in the field for use by students and evaluation by their teachers. The plan was that each student participating in the field trial would progress through the entire program as they would normally progress through other reading programs. As each student worked through and completed each level, data to be used in revisions were collected. Arrangements were made with both local day schools and residential schools for participation in this field trial. The original sites were:

Broadleigh School
3039 Maryland Avenue
Columbus, Ohio 43209

Brook Forest School
2801 York Road
Oak Brook, Illinois 60521

Butterfield School
2 S. 500 Gray Avenue
Lombard, Illinois 60148

Dearborn Heights School
9620 Normandy Avenue
Oak Lawn, Illinois 60453

Kentucky School for the Blind
1867 Frankfort Avenue
Louisville, Kentucky 40206

Missouri School for the Blind
3815 Magnolia Avenue
St. Louis, Missouri 63110

Rupley School
305 E. Oakton
Elk Grove Village, Illinois 60007

To implement this plan, project personnel took the first set of completed lessons to the field trial sites to review specific procedures and program objectives with participating teachers. Project personnel then made observation visits to field trial sites periodically to monitor progress by students and note recommendations of teachers regarding the effectiveness of the lessons.

During the final site visit, the evaluation form for the readiness level was taken to teachers and reviewed in detail. When students completed this level teachers were asked to return their lesson plans, which had been annotated while presenting each lesson, and to complete and return the evaluation forms which served to summarize the comments and pinpoint specific areas for revision. A test, criterion referenced to the readiness level, was administered by project personnel as students completed the level.

6. Final review by consulting committee

   Following the collection of data from the field trial, the complete readiness level was sent to the full committee for review and recommendations for revision. A full committee meeting was then held to make final decisions regarding revisions of the readiness level. Since the preprimer and primer materials had been written, they were also reviewed by the full committee.

7. Revisions of the readiness level

   Revisions of the readiness level based on the teachers' recommendations, test data, and on the committee recommendations were completed during FY 1977 by the directing editor and the project staff.

Progress during 3rd Year (1977-78)

The major objective for the 3rd year of the project was the development of the first, second, and third readers with accompanying workbook materials and teachers' editions. In addition, the field trials of the preprimers and primer were continued. To accomplish these objectives, the procedures described earlier were continued. Basically, the following plan was followed:

1. Writing of the first, second, and third readers

   The directing editor was primarily responsible for the writing of all materials on these levels. The first reader

level contained 44 lessons; the second reader, 50 lessons; and the third reader, 50 lessons. These materials were written during this project year.

2. Review by consulting committee

   Members of the consulting committee and members of the project staff continued to review the materials as they were written. Recommendations for revision of each level were made as the writing of that level was completed.

3. Ongoing field trials

   The procedure for the field trial which was initiated during the 2nd year of the developmental phase of the project was continued during the 3rd year. Teachers who were new to the program this year were introduced to it by staff members who also explained the evaluation procedures. Students participating in the field trial worked on lessons from the preprimer level through the first reader level during this time. The staff continued to monitor the progress at the various sites.

4. Revisions continued

   Revisions were begun for each level as all students participating in the field trial completed that level. Since each child progressed at his own rate, students did not complete each level at the same time. Therefore, the schedule for making revisions was dependent on the rate at which the students progressed. For this reason, the completion of the revisions extended beyond the scope of the 3-year developmental phase as outlined in the original proposal.

   As stated earlier, revisions were based on child-use data from teachers, test data, and committee recommendations. All these data were summarized for each level and that level was then revised accordingly.

Progress during Extension Period (1 September 1978 - 28 February 1979)

Because of the expanded scope of the field trial and subsequent delay in revising the materials, a request was made to the Bureau for the Education of the Handicapped for the use of funds remaining from the original grant to extend the developmental phase of the project through a 6-month period. This request was granted and the funds were used to continue the field trials and the revision of the materials.

A summary of project progress and activities during this period follows:

1. Readiness level

   Field testing and revision of the readiness level were completed prior to the 6-month extension period. Therefore, any work done on this level was related to their preparation for production. Final editions of the readiness level materials were turned over to the APH Production Department in January 1979 and will be ready for sale in September 1980 (at the beginning of the 1980-81 school year). The sale of these materials was delayed until the preprimer and primer levels were ready to insure that students using the series would not complete the readiness level before other levels were ready to be sold.

2. Preprimers

   Field testing of the preprimers was initiated, but not completed, during the developmental phase of the project. Ten students completed all three preprimers during that phase, but eight students did not complete the preprimers until the extension period. Therefore, revisions of the preprimers were made during that period.

3. Field testing of the primer was also initiated, but not completed, during the developmental phase of the project. Only two students completed it prior to the extension period. Ten more completed it during that period. Since seven more students in the field trial did not complete the primer during the extension period, revisions were not begun at that time. Revisions were scheduled to begin as soon as all students completed the primer level.

4. First reader

   During the extension period two students began work on this level, thus initiating the field trial. Revision and production schedules will be based on the completion of this level by all students in the field trial.

5. Second reader

   No students were ready to begin work at this level and, for this reason, field trials were not conducted. Field trials for this level will begin as soon as students have completed the first reader. Revision and production schedules will be based upon the completion of this level by all students in the field study.

6. Third reader

   When students are ready to begin work at this level, field trials will be initiated. Revision and production schedules will be based on the completion of this level by all students in the field study.

## Project Summary

The 3-year project period and 6-month extension period described above were funded through a grant from the Bureau for the Education of the Handicapped, U.S. Office of Education. During this period, all objectives of the project were achieved. A detailed set of specifications was developed, vocabulary and teaching method selected, and the six levels of the primary braille reading program were written. Each of these levels included students' texts, worksheets, and teachers' guides. These activities met the project objectives.

As these activities progressed, the scope of the project was greatly expanded. This expansion occurred in two areas. One area was the evaluation (field trial) phase. Initial plans called for teacher evaluations of the entire set of materials with additional review by the consultory committee. The revised evaluation plan included a complete field trial of the materials as they were used by students in both public and residential schools. These students progressed through the series at their own individual rates and their teachers completed extensive evaluation forms which provided data to be used in the revision process. The expansion of the field trial in this manner resulted in a much longer and much more valid evaluation phase than that originally planned.

The other area of expansion was the development of criterion referenced tests to accompany each level of the program. The development of these tests was funded by the American Printing House for the Blind. They were developed because standardized reading tests, which are not based on the sequence of vocabulary and skills presentation used in the primary braille reading program, could not be used to monitor student progress.

The expansion of the project in these ways extended the amount of time necessary to prepare the entire set of materials for final production. It has resulted, however, in a more complete and valid reading program than one developed using the original procedures.

## Future Directions

In final form this reading program will be known as Patterns: The Primary Braille Reading Program. It will consist of six levels: readiness, preprimer, primer, first reader, second reader, and third reader. Each level will consist of a student text, worksheet materials, a teachers' edition, and a criterion referenced test. In addition, a set of review worksheets is being developed for each level. These worksheets are based upon results of the field trial and the criterion referenced tests and are designed to provide additional review and drill in areas in which students encountered problems.

With this set of materials, teachers will be able to teach the basic skills of reading, monitor student progress, and remediate where necessary.

Future plans call for the production and dissemination of the entire program by the American Printing House for the Blind. In order to assure consumers that each level of the program will be available as it is needed, the following production schedule is planned:

| | | |
|---|---|---|
| Readiness, Preprimer, Primer | - | available September, 1980 |
| First Reader | - | available September, 1981 |
| Second Reader | - | available September, 1982 |
| Third Reader | - | available September, 1983 |

Other plans for dissemination of this program include in-service and pre-service workshops designed to train teachers to use the materials in the most effective manner possible. These workshops will be funded primarily by the American Printing House for the Blind, with some assistance from school systems in which they will be conducted.

Response from the field to the program has been extremely positive. Teachers and administrators from both residential and local day school programs have indicated that a critical need exists for materials to teach children who use braille to read. A similar response has come from teacher training programs. Since the field trial results in both residential and local day school programs have been excellent, it appears that Patterns may at least partially meet the need described earlier.

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